

CLAIMS

I claim:

1. A robotic surgical device comprising:

an elongated body; and

a plurality of robotic arms extendable from a distal portion of said elongate body, wherein at least one of said robotic arms comprises two or more joints.

2. The robotic surgical device of claim 1 further comprising:

an image detector positioned at said distal portion of the said elongated body.

3. The robotic surgical device of claim 1 wherein said robotic arms are housed within said distal portion of said elongated body and each of said robotic arms is further configured for deployment through a distal end of said elongated body.

4. The robotic surgical device of claim 1 wherein at least one of said robotic arms is housed within a separate chamber located within said distal portion of said elongated body and each of said chambers has a port located at a distal end of said elongated body for deployment of said robotic arm.

5. The robotic surgical device of claim 1 wherein at least one of said robotic arms further comprises a surgical tool attached to a distal end of said robotic arm.

6. The robotic surgical device of claim 1 wherein at least two of said robotic arms comprise a rear-arm with a proximal end connected to said elongated body through a first joint, and a forearm connected to a distal end of said rear-arm through a second joint, wherein said first joint permits a distal end of said rear-arms to expand radially from a center axis of said elongated body.

7. The robotic surgical device of claim 6 wherein said second joint permits a distal end of said forearm to converge toward said central axis of said elongated body while said rear-arm is expanded radially.

8. The robotic surgical device of claim 7 wherein each of said robotic arms further comprises a surgical tool attached to a distal end of said robotic arm.

9. The robotic surgical device of claim 2 wherein said image detector is attached to a distal end of said elongated body.

10. The robotic surgical device of claim 1 further comprising:

an image detector attached to one of said robotic arms.

11. A robotic surgical device for performing minimally invasive surgery comprising:

an elongated tubular body having a plurality of chambers, each of said chambers has an opening at the distal end of said elongated tubular body; and

a plurality of robotic arms, wherein each of said robotic arms is slideably positioned within one of said chambers.

12. The robotic surgical device of claim 11 further comprising:

a camera attached to said distal end of said elongated tubular body.

13. The robotic surgical device of claim 11 wherein a distal portion of said elongated tubular body has a diameter of 30 millimeter or less.

14. The robotic surgical device of claim 11 comprising three or more robotic arms.

15. The robotic surgical device of claim 11 wherein each of said robotic arms comprises at least three arm sections, a first arm section slidably adapted within one of said chamber, said first arm section connects to a second arm section through a first

joint, and a second arm section connected to a third arm section through a second joint, wherein said first joint allows said second arm section to rotate relative to said first arm section while at the same time the third arm section can rotate about the second joint in a direction independent of the rotation of said second arm section.

16. The robotic surgical device of claim 15 further comprising:

a camera attached to said distal end of said elongated tubular body.

17. The robotic surgical device of claim 16 wherein each of said robotic arms further comprises a surgical tool connected to a distal end of said third arm section.

18. The robotic surgical device of claim 17 wherein a distal portion of said elongated tubular body has a diameter of 12 millimeter or less, and each of said robotic arms has a diameter of 5 millimeter or less.

19. The robotic surgical device of claim 16 wherein each of said robotic arms further comprises a third joint having at least three degrees of freedom connected to a distal end of said third arm section, and a surgical tool is connected to said third joint.

20. The robotic surgical device of claim 19 wherein said robotic arms are configured such that at least two robotic arms can be directed by a user to approach a predefined tissue region from two separate directions.

21. A method for performing a minimally invasive surgical procedure comprising:

inserting a distal portion of an elongated robotic surgical device into a patient's body; and

deploying a plurality of robotic arms through a distal end of said robotic surgical device.

22. The method of claim 21 further comprising:

operating said robotic arms through visual feedbacks provided by an image detector positioned at a distal end of said robotic surgical device.

23. The method of claim 22 further comprising:

operating two or more of said robotic arms to dissect tissues within said patients body.

24. The method of claim 21 further comprising:

making an incision on said patient's body prior to inserting said distal section of said elongated device into said patients body through said incision, wherein said incision has a width of less than thirty millimeters.

25. The method of claim 21 wherein each of said robotic arms comprises two or more joints.

26. The method of claim 21 wherein each of said robotic arms comprises a rear-arm connected to said distal section of said robotic device through a shoulder joint, and a forearm connected to said rear-arm through an elbow joint.

27. The method of claim 23 further comprising the step of:

rotating said rear-arm away from a central axis of said elongated robotic surgical device while at the same time rotating said forearm toward said central axis.

28. The method of claim 21 further comprising the step of:

maneuvering said robotic arms to detach said patient's gallbladder from tissues surrounding said gallbladder.

29. The method of claim 21 further comprising the step of:

maneuvering at least two of said robotic arms simultaneously in a coordinated manner inside said patient's body.